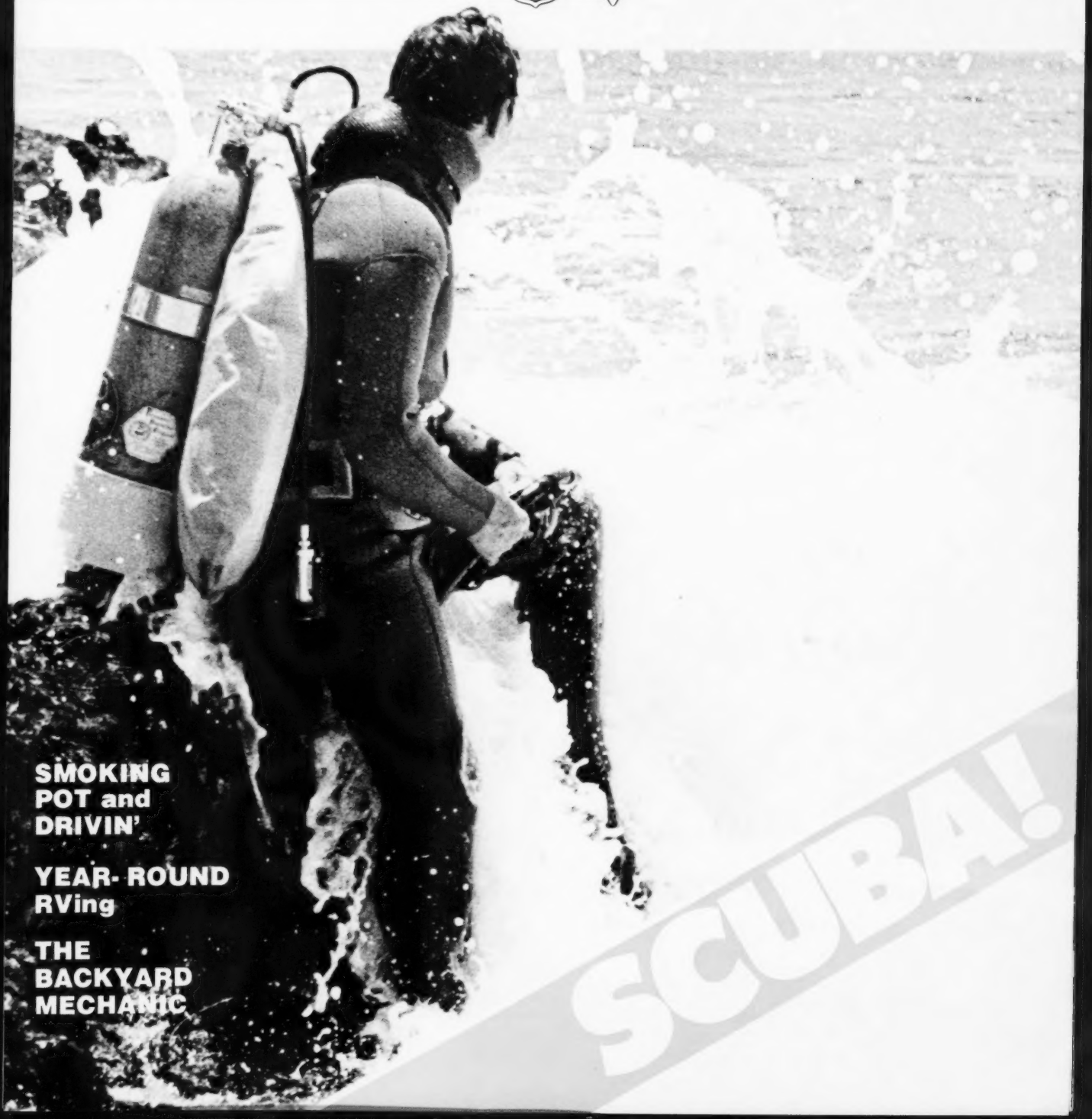
DRIVER

AUGUST 1976



SMOKING POT and DRIVIN'

YEAR-ROUND RVing

THE BACKYARD MECHANIC

SCUBA!

DRiVER

SCUBA DIVING

by MICHAEL P. STAPLES

The next time you're rolling down the highway, try counting the diver's stickers pasted on rear windows, bumpers, and fenders of the cars around you. You may be surprised how many there are. This red emblem with its white diagonal slash is the scuba diver's flag, an insignia especially prominent along the Atlantic, Pacific, and Gulf Coasts where divers number in the hundreds of thousands. In California alone there are some 600,000 divers who somehow find the strength to drag themselves and their bundles of heavy equipment out into the freezing California waters, weekend after weekend, weather notwithstanding.

"Rain!" exclaimed one diver. "Who cares about rain? You're going to get wet anyway!"

Indeed, neither rain nor snow nor gloom of storm deters the bands of die-hard Tankers and Snorkelers who invade the Pacific, scooping up abalone in large booty-bags, tempting one to conclude that perhaps there might be something fairly attractive about all of this underwater activity. (Abalone, in case you didn't know, are rock-clinging mollusks that are not only delicious to eat but also provide beautiful shells with mother-of-pearl lining.)

GETTING INTO IT

Various certification standards must be met before you can be registered with a national or international organization such as NAUI (National Association of Underwater Instructors) or NASDS (National Association of Skin Diving Schools). Without such registration you

Mike Staples is a Chapter Safety Coordinator of the American National Red Cross. A 4½-year veteran of the Marine Corps, he saw combat duty with a bomb disposal team in Vietnam in 1968-69 and was honorably discharged in 1970 as a buck sergeant. Mike has been scuba diving for five years, enjoys rock climbing, and is rated as an instructor in the martial art of Kung-Fu, being a Hop-Gar and White Crane representative.

Scuba cylinder is placed in tank of water during filling, a safety precaution because of the tremendous pressures held in the filled cylinder. The DOT (Department of Transportation) rated working pressure for the scuba cylinder is stamped on the neck and must never be exceeded—it weakens the cylinder. Scuba cylinders are to be filled only with pure compressed air, *never* from a tire hose at the service station.

won't even be able to fill a scuba tank with air, and to meet their standards you must choose a diving school and attend special classes designed to get you certified.

In choosing a school it is wise to go to a few, collect data from each, and compare what you will be getting from each for your money. Find out how many hours of instruction you'll receive, how much time you spend in the pool, how many open water dives you'll go through, and how much of your equipment is furnished.

One of the questions foremost in your mind will probably be, "Just how much am I going to have to fork over to get set up with the necessary equipment?"

Initial instruction usually costs around $65 and includes classroom, pool, and open water (ocean) training, but you may be required to purchase equipment to get through the class.

Basic equipment needed for skin diving (the difference between skin and scuba diving being that the scuba diver carries a tank of air with him while the skin diver is usually confined to the use of a snorkel) are mask, fins, and

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DRIVER

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

AUGUST 1976

VOLUME 10 NUMBER 3

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DEPARTMENT OF THE AIR FORCE ■ HQ AIR FORCE INSPECTION AND SAFETY CENTER
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PUBLISHED IN COOPERATION WITH THE DEPARTMENT OF THE ARMY AND THE DEPARTMENT OF THE NAVY

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AFRP 127-1

SUBSCRIPTION—DRIVER is available on subscription for $8.65 per year domestic; $2.20 additional for foreign mailing, 75c per copy, through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. Single copies will be sold and back copies will be furnished when available. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. No payment can be made for manuscripts submitted for publication. Contributions are welcomed, as are comments and criticism. Address all correspondence to the Editor, DRIVER Magazine, AFISC/SEDD, Norton AFB, CA 92409.

ATTENTION DEPT OF THE NAVY PERSONNEL: Address all queries concerning distribution to NAVSAFECEN, NAS, NORFOLK, VA 23511, Attn: Safety Publications Dept. All other correspondence will be welcomed by the Editor.

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Certain individuals shown in this magazine are not members of the Air Force and therefore do not conform to Air Force grooming standards.

THE EDITOR SPEAKS

DOUBLE CLUTCH

SMALL CARS VS BIG CARS: BATTLE GOES ON

Occupants of small cars are 75% more likely to be killed and 38% more likely to be maimed in an accident than big-car passengers. And America's current switch to small economy cars will result in a 40% increase in highway deaths by 1980 when the number of compacts and full-size cars on the road reach a 50-50 split.

That's the thrust of a special study by Allstate Insurance Company recently presented at hearings conducted by the National Highway Traffic Safety Administration in Los Angeles.

"Most accidents involve front-end crashes between two cars, and a small car's lack of front-end over-hang to absorb impact results in more injuries to occupants," explained Allstate's auto engineering director, Jack Martens. "A car doesn't have to be heavier to be safer—it's just that heavier cars generally have longer front ends."

The report also says American-built small cars are less crashworthy than European models. "American law says nothing about making cars crashworthy or about protecting the people in them," Martins related. "At a speed of 30 mph, the manufacturers have only to show that the windshield is retained, that there is no fuel leakage, and that the steering column does not produce an intrusion of greater than five inches."

Research tests for the study showed that stiffening the front doors on small cars and adding energy-absorbing foam to their front ends would substantially cut down on the number of fatalities and serious injuries resulting from small-car crashes. The size of a car is more important than its weight in terms of safety, the report said.

The report also cites evidence supporting the installation of air bags in the front compartments of all cars, especially small models, to prevent passengers from becoming human projectiles in collisions.

"Air cushions could save nearly 70,000 lives and prevent 1,750,000 disabling injuries in the next 10 years," the report says, completely wiping out the projected 40% increase in fatalities.

"A complete air bag system could be installed for as little as $180," an Allstate spokesman stated, "but the industry's not going to put anything in cars unless it's either required by law or promotes the sale of more cars."

A pair of divers operating as a unit—"buddies"—are the most important safety procedure. The cardinal rule of diving is NEVER DIVE ALONE. Under water, depending on visibility, divers should not be more than 25 feet apart.

snorkel, but in cold waters you will also need an exposure suit, weight belt, and perhaps a BC (buoyancy compensator).

The mask you purchase should be fitted to your face, a proper fit being essential, and will cost anywhere from $8 to $25 unless you wear glasses in which case it runs around $60. If your eyes are not that bad, you can sometimes get by with a prescription faceplate which corrects for slight diopter deviations. But if you need something more, there are special opticians, usually contacted through your school, who grind and fit lenses to the faceplate of your mask.

OTHER EQUIPMENT

There are many kinds of fins, but probably the most popular today is the rocket or jet type which costs around $20. Although no one fin will be satisfactory for all people, scientific design has made the jet fin one of the most popular on the market.

Important factors in choosing fins are weight and rigidity. If the fins are too stiff your legs will tire easily and your body quickly loses heat. If they are too flexible, you will have to kick twice as hard to get to where you're going. You get tired and, again, lose heat. Both rigidity and fit are very important, and you may want to purchase a pair of booties to fit the fins if you're going to swim in cold waters. They usually come with a full wet suit but can be purchased separately for about $15.

Next on the list is a snorkel – a J-shaped piece of tubing through which you breathe while floating face down in the water. The snorkel usually costs around $8, but there are a variety of types and the cost varies. Snorkels differ in length, diameter of tube, mouthpiece design, and size. The tube itself, which wraps around the diver's head, varies in construction. Perhaps the most important factor in purchasing a good snorkel is comfort, so try it on.

EXPOSURE SUITS

This is the basic equipment you will probably need for a diving class. But if you intend to go swimming in cold waters you also will need an exposure suit. Without it you can't stay in cold water for more than 10 to 15 minutes. With it, you will be as warm as your suit is good.

There are actually three categories of exposure suits: wet suits, absorbent cloth suits, and dry suits. The wet suits are by far the most popular.

Wet suits are designed to permit a small amount of water in, creating a film of water between the diver and the suit which becomes heated by the diver's body. Needless to say, to retain a proper film of water the wet suit must fit properly. Like the rest of the equipment a wet suit can be rented. A rented suit, however, won't keep you nearly so warm as a custom-built suit because much of its ability to retain heat will be lost. When fitting you, a suit maker will take some 20 to 30 measurements to get that just-right fit. Custom wet suits start at around $100 and climb rapidly according to the extras you tack on.

continued

It's best to put off buying a suit until you are well into the course material of a diving class. Here you will learn the pros and cons of construction and personal needs, and at the price, who can afford to take a chance on a bad buy?

The last item you need to be outfitted for snorkeling is a weight belt, because the rubber wet suit is so buoyant it will keep you from diving down in the water. To overcome this problem, you need a belt with lead weights to achieve a "neutral buoyancy" (where you neither float nor sink). A belt costs about $6 plus $1 per pound of lead (one pound required per 10 pounds of body weight).

Most divers today also insist on a buoyancy compensator, which is a vest you inflate with air to further help you to achieve neutral buoyancy. The BC is also used as a life vest in emergencies since it is equipped with an automatic inflation CO_2 device. BCs cost around $50.

So there you have it. To get into the water, skin-diver equipped, you need mask, snorkel, fins, wet suit, belt and weights, and BC.

This can all be rented, but if you decide to buy, tack on the cost of diving lessons, an abalone-knife to pry the little devils off the rocks, a float to put them on once you break them loose, and a fishing license so you don't get busted. You now begin to understand why there are hordes of abalone divers out in that freezing water every weekend, shrivering and grinning blue-lipped smiles over their abalone. After buying all that equipment, they're so broke they have to catch abalone to eat!

But hold on, that's not all. All this is only skin diving. If you want to be a bonafide, certified SCUBA diver with hoses and tanks and pressure gauges and all that stuff, there's more to come.

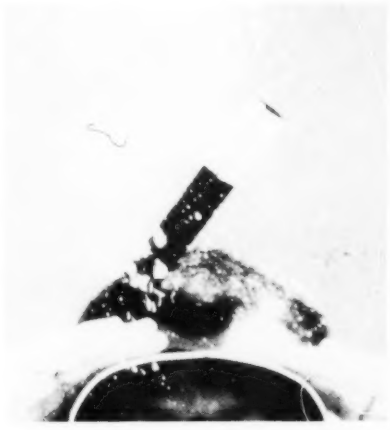
WHAT IS DIVING CERTIFICATION?

"SCUBA" is the acronym for Self-Contained Underwater Breathing Apparatus. Because you carry your own air supply, you can stay under water for long periods of time.

If the only problem a diver had to contend with was calculating how much air he had and when to return to the surface before running out, scuba diving would be a relatively easy sport. But unfortunately a diver has more to worry about. Take for instance the effects of pressure as you sink into the depths – pressure not only on your ears and sinuses but on the air you are breathing as well.

Your air – as you descend – compresses to a point where, at 30 feet for example, you are actually breathing considerably more air than at sea level. The deeper you go the more air you inhale per breath because of greater compression of the air in your tank. You might have had an hour's worth of air at sea level, but you have only a few minutes of air at a depth of 100 feet.

The fact that air compresses with depth brings further complications to the sport. Suppose, for instance, you are down 60 or 70 feet, watching the fish watch you, and you become frightened for some reason. Hastily, you make for the surface only to find that you are now dead! Why? Because you absent-



Should the scuba diver be able to swim? Of course, but that doesn't mean he has to be a candidate for the Olympics. If he can complete the YMCA proficiency test* and is comfortable in the water, he's ready. (*Tread water 3 minutes. using feet only; swim 300 yards; stay afloat 15 minutes; swim 15 yards underwater.)

mindedly held your breath on the way up, forgetting the compressed air in your lungs was expanding to its sea-level size, and the expanding air popped a hole in your lung wall, introducing an air bubble into your blood stream. You have become just another *air-embolism* death statistic.

This may sound kind of far out but the fact is that after breathing compressed air under water, rising no more than four feet while holding your breath is sufficient to cause an *air-embolism*.

Scuba diving is filled with complications such as this. It's important to remember that you are functioning in an entirely different world underwater and that the hazards, although avoidable if understood and respected, are very real. Recognizing the hazards of scuba diving is what diving instruction is all about.

WHAT TO LOOK FOR IN CLASS

Roughly, your training should include instruction from a certified instructor on the use and care of scuba

continued

A good diving class will cover all aspects of scuba diving from equipment care to buddy-breathing. With scuba equipment, everything you do in the water takes on a new dimension. Even simple maneuvers such as entering the water must be relearned.

Scuba diving classes are usually limited in size to give each student as much personal attention as possible.

diving equipment, laws of physics relating to scuba diving, physiological and medical-psychological problems related to diving, marine hazards, first aid, Navy decompression tables, recommended diving practices, ecology, oceanography, and laws and ordinances associated with the sport.

There should also be instruction in the use of the mask, fins, snorkel, and personal floatation devices; surface dives; water entries; and using weight belts under normal and emergency conditions. In open water you should probably receive at least nine hours of training. You should be required to perform one dive from shore and pass a written examination which will reflect your understanding of diving physics, physiology, and emergency procedures before being certified.

UNDERWATER SAFETY

There's a sign hanging over the entrance to the famous underwater physiology laboratory of Siebe, Gorman & Co, Ltd. of London:

> *"There are old divers, and there are bold divers . . .*
> *But there ain't no old, bold divers."*

Practitioners of dangerous crafts have been saying that about themselves for years of course – airplane pilots, for example. But that doesn't make it any less true. Anyone with a consuming need to impress people by defying all laws of commonsense and nature should take up some sport other than diving.

Diving accidents occur for the same reasons accidents occur in other hazardous activities: Faulty judgment, lack of training, or failure to recognize the limits of one's equipment or one's self. But the real cause of most diving accidents is *panic*, that unreasoning fear that robs the individual of logical thought and reduces him to instinctive acts.

There's a great difference between fear and panic. Fear produces adrenalin that speeds the heart action, pumps more oxygen to the brain. You get a boost just when you need it most. It's absolutely normal – even essential – to feel alarm if you surface after a dive, faced with a five-mile swim to shore because your boat has snapped its anchor and drifted away. The untrained diver may panic and lose all control. The well-trained diver will look the situation over and follow the emergency procedure in which he has been trained.

BUDDY SYSTEM

The best safety system you can find is a pair of divers operating as a unit with each responsible for the other's safety. You will want to choose your buddy carefully, on the basis of his discipline, judgment, attitude, fitness and watermanship.

When diving, keep your buddy in sight. Depending upon visibility, you should never be more than 25 feet apart and should surface immediately if you become separated. In poor visibility, divers should use a buddy line, a nylon line about six feet long. Each wraps an end around his hand. The line is never tied to the body or equipment.

The octopus regulator provides air to two divers at once in case of emergency and is recommended for all but the most casual diving excursions. The octopus is essentially a single hose regulator which has an extra low pressure port to which an additional second stage is fitted. The auxiliary mouthpiece can be held out of the way by neckstrap until needed.

The primary cause of diving fatalities is drowning. Despite what you might think, equipment failure is rarely a contributing factor. The possibility of drowning can be almost eliminated through a healthy respect for the sea and strict adherence to the buddy system. Under almost any circumstances, the diver can survive if he keeps his head. He can stay afloat for days – his exposure suit (wet or dry) will provide more buoyancy than he needs.

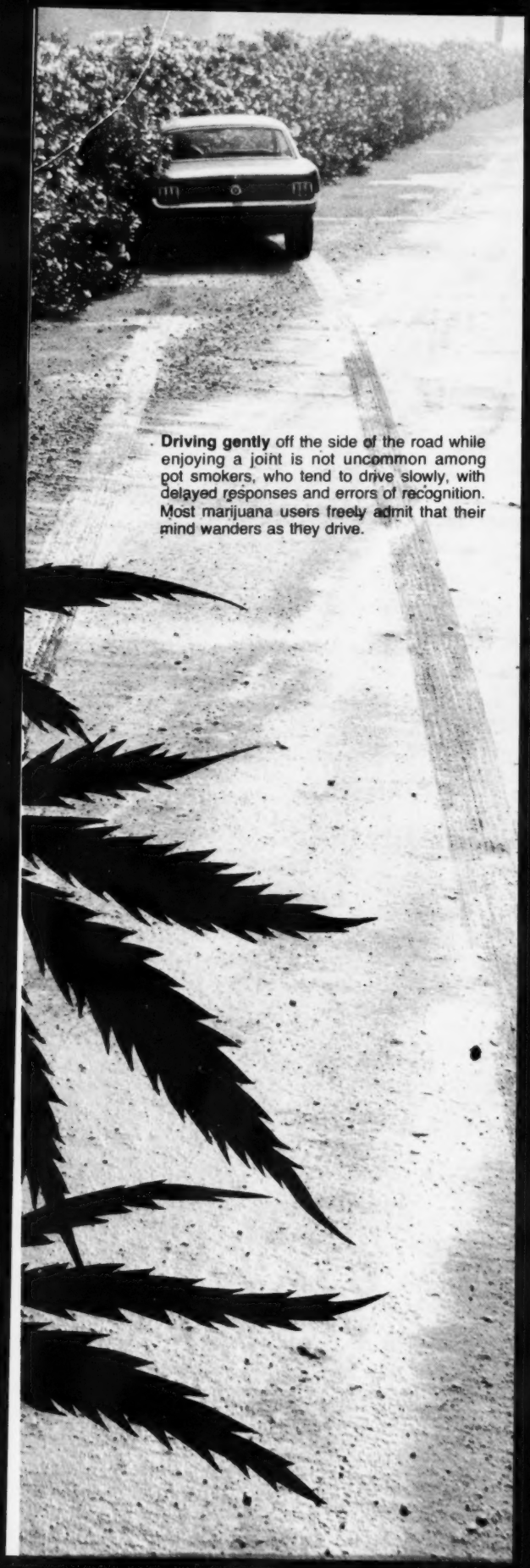
Experienced divers who have read this far may wonder why we have covered some facts and omitted many more. Unfortunately, a single article cannot hope to tell the beginner everything he needs to know. If you are interested in this fascinating sport, by all means read all you can find about it before you start to invest your hard-earned cash. One of the best and most entertaining books is "Diving For Fun" by Joe Strykowski (published by Dacor Corp., 161 Northfield Rd., Northfield, IL 60093). Joe is the host of a TV series called "Man and Sea." He is not only an underwater filmmaker but a pioneer of diving safety. Check your library for other books and magazines.

Diving, hang gliding, snowmobiling, mountain climbing . . . whatever's your bag, it's all the same. Good physical condition, good training, good equipment, good sense. . . .

NO COMMENT

These photos were sent to us by AMH-1 Raymond O. Baker, VC-8 Safety Petty Officer. He came across the motorcycle in the parking lot at Roosevelt Roads, Puerto Rico. We refrain from comment, except to ask: Would you allow your equipment to look like this?

"Our life's too fine
to let it die"
— JEFFERSON AIRPLANE



Driving gently off the side of the road while enjoying a joint is not uncommon among pot smokers, who tend to drive slowly, with delayed responses and errors of recognition. Most marijuana users freely admit that their mind wanders as they drive.

smoking POT and DRIVIN'

Men and women of all ages, and especially young people in the military services, today face a variety of problems and consequences for DWI or "driving while under the influence"—not just of alcohol but also of marijuana. Marijuana is still controversial—medical experts and government officials wrangle over whether it's bad or just so-so for users. At least six states—Alaska, California, Colorado, Maine, Ohio, and Oregon—have passed bills making its possession a civil instead of criminal offense. And at the federal level, a Senate committee is considering legislation to remove criminal penalties if one is caught with only a small amount of pot in his possession.

More than 53% of people in the 18-to-25 year age group have tried marijuana at some time or other, if we can believe the statisticians. That makes it the nation's third most widely used recreational drug—exceeded only by alcohol and tobacco. For a long time the general population went along with the notion that the pot-smoker was no more of a hazard on the road than the tobacco-smoker. But now people are realizing what the specialists have known all along—that is, the marijuana-smoker has very serious problems behind the wheel. But the pot-user himself may not believe this because the drug may make him slow and cautious, rather than aggressive and careless as alcohol frequently does.

Like alcohol, marijuana affects different people in different ways, depending on their physical condition, food intake, rest before and after smoking, drug potency, amount consumed, and the simultaneous use of other drugs such as alcohol.

Effects of a marijuana high generally wear off after two to four hours. But no expert is willing to offer the smoker a rule of thumb for how long to wait between the last joint and the drive home. There are just too many variables.

"There aren't as many smokers as drinkers on the highways," says Dr. James Nichols of the National Highway Traffic Safety Administration, "but a significant number of people behind the wheel have been smoking marijuana. There will probably be more after decriminalization is more widespread."

Just how does pot affect a vehicle operator? Well, primarily it seems to interfere with the driver's perceptual aspects, which means that he does not *see* and *understand* what he

continued

sees as well as he ordinarily does. Although researchers still disagree over exactly what abilities are essential to safe driving, most do agree that perceptual errors cause almost half of all the traffic accidents attributed to human errors.

Pot-puffing subjects in carefully controlled experiments have demonstrated these traits that spell trouble behind the wheel:

- An increase in errors of recognition. (What does that arrow mean?)
- Delay in response to visual cues. (Takes longer to hit the brakes after the child runs into the street.)
- Impairment of both concentrated and divided attention. (The mind wanders.)
- Failure to detect peripheral visual and auditory signals in the environment. (The driver doesn't see and hear everything he ordinarily would.)
- A large and consistent reduction in vigilance. (Carelessness)
- A tendency to drive at slower speeds.
- Increased starting and braking times.

In an informal survey at the University of California at Los Angeles, almost half of the students who said they were regular pot smokers readily admitted they frequently drove while high. Many of them added that they tried to make up for the effects of pot by driving more cautiously. To determine what the effects actually were, UCLA put hundreds of grass users through a series of driving tasks in a complex driving simulator. In another study, the Canadian government set up a driving course situation to evaluate performances of smokers under simulated traffic conditions in a large city. Here's what the two groups found about driving under the influence of marijuana:

- A driver who fails to recognize a yield sign may enter an intersection without giving right of way to drivers on the through street.
- A driver suffering from delayed recognition ability may not interpret a red and white "No Entry" sign until it is too late.
- A driver who is having a hard time concentrating on several aspects of the environment at once may not notice a pedestrian starting out from the curb.
- A driver who can't sustain his attention will have great difficulty monitoring his speed.

To determine whether these "test tube" results would be confirmed by smokers, DRIVER interviewed several pot users in the 18 to 40 age group. Each was specifically asked to tell us how he or she reacted while driving under the influence. Here are some things we were told:

The thing about driving and smoking pot is that your mind wanders a lot. It all comes down to – I'm thinking a lot about nothing. If I've got somebody with me, I think about what we're saying. I might talk for 10 minutes and take five hits. Very rarely do I smoke a whole joint by myself. I always have my stereo on real loud. I listen to the music more than the words. I get real good vibes from the music. I hit the steering wheel with my hands. I push down on the accelerator or I keep pushing on it 'til I'm going 75 or 80.

I look in the rearview mirror to see if there's a cop behind me – I get a little paranoid. I keep my window rolled down a little bit so the smoke goes out, and it won't smell if a cop stops me. I back off the accelerator, then I get entranced in the music and start pushing my foot down again.

I always drive in the fast lane except when I'm smoking pot. Then I drive in the middle lane so I won't attract attention. I would rather drive on the freeway than on streets, because you have to deal with traffic signals and stop signs and people. I remember I didn't see the red light once – I drove right through it – and I was looking right at it. I knew it was there. I didn't realize it until my wife yelled at me.

A user wrote to the National Safety Council after reading an article, "When Drivers Go to Pot":

"I have smoked pot for seven years and I can confirm what your article says. Driving is more difficult while under the influence of pot. It does make you drive slower and decreases your

continued

Analyzing blood samples continues to be one of four methods employed by both researchers like this medical technician and law enforcement agencies to identify suspected pot users. However, a simpler method for detecting the presence of marijuana in individuals arrested for traffic violations will be available soon.

ability to judge distance. Often I've found myself stopping too soon for an intersection, and I have slipped off the side of the road as my mind wandered.

"Pot does some damage to memory, too. People I know who have quit confirm a better memory after stopping for six to eight months. I myself have cut down from a two-ounce-a-week habit to an ounce-a-month, and I can notice a definite difference, being more alert on the whole."

Col Clarence K. Whiteside, a physician and former drug abuse officer for the Air Force Systems Command, tries to look at the problem realistically. "Marijuana is different from alcohol and hard drugs," he explained.

"Pot's a hallucinogenic type of drug. It slows down the mental processes of the user. It puts him behind the action. He therefore perceives that he can react in time. Result is a judgmental error that can be fatal if he's driving a car or motorcycle."

Dr. Whiteside says grass also gives smokers a sense of false confidence in their ability to perform. "Persons who use it generally admit that they feel funny or different – that they wouldn't be afraid to drive in the Indy 500. Most of them just don't feel it degrades their driving ability."

In a recently completed three-year study of fatal traffic accidents in Boston involving alcohol and drugs, investigators found that 26% of the drivers used alcohol alone, 9% alcohol and marijuana, and 4% alcohol with pot, barbiturates, and other drugs. The same study showed that 16% of surviving drivers considered most responsible for a fatal accident admitted to being under the influence of pot at the time of the crash.

Detecting persons using marijuana long has been a problem for both researchers and law enforcement officials, because quantities consumed are very small compared to alcohol. It is rapidly transformed by the body into other chemical compounds. Detection requires detailed analysis of blood, saliva, urine, or breath.

But traffic police will soon have a simple roadside testing device to detect the presence of marijuana in persons stopped for traffic violations.

Ever since thousands of military personnel were introduced to drugs during the war in Southeast Asia, the Department of Defense has been conducting random drug abuse urinalysis tests at all military bases and on ships with adequate medical facilities. Each service now has a comprehensive drug abuse prevention and control program designed to help – not punish – all users who voluntarily seek rehabilitative assistance. If you are using pot or other drugs, you will be interested in how it works:

Voluntarily present yourself to your commander, skipper, top NCO, or to a social actions or medical person and you will be *exempt* from:

1. Disciplinary action for use or possession of drugs under the Uniform Code of Military Justice; and

2. Administrative discharge under less than honorable conditions based in whole or in part upon such personal use or possession of drugs incident to personal use.

It's a confidential program, and any interested military member can obtain further details by contacting a drug/alcohol counselor or specialist. Some military facilities provide professional counseling service by telephone so a caller can remain anonymous if he chooses. Ask your base telephone operator for the number to dial.

Volunteering is the easy and best way to get into the drug rehab program. However, DOD reports that most service personnel are mandatorily enrolled after being arrested or investigated for possessing or using drugs. Others are identified for rehabbing following medical care or detection through urinalysis.

Marijuana is involved in 83% of all DOD cases of drug abuse, although some military bases say pot smokers number up to 97% in their programs.

SSgt Richard Tavares, drug abuse control NCO at Norton AFB, Calif., said the reaction of most pot users to the program is, "Hey, I don't need rehabbing – pot doesn't hurt me."

"Debating the physiological and psychological effects of marijuana may be useless," he pointed out. "It's illegal – plain and simple – and many things may happen from disciplinary and administrative actions, including inability to get ahead. To a military man or woman, this fact alone can have severe consequences or repercussions in and out of the service."

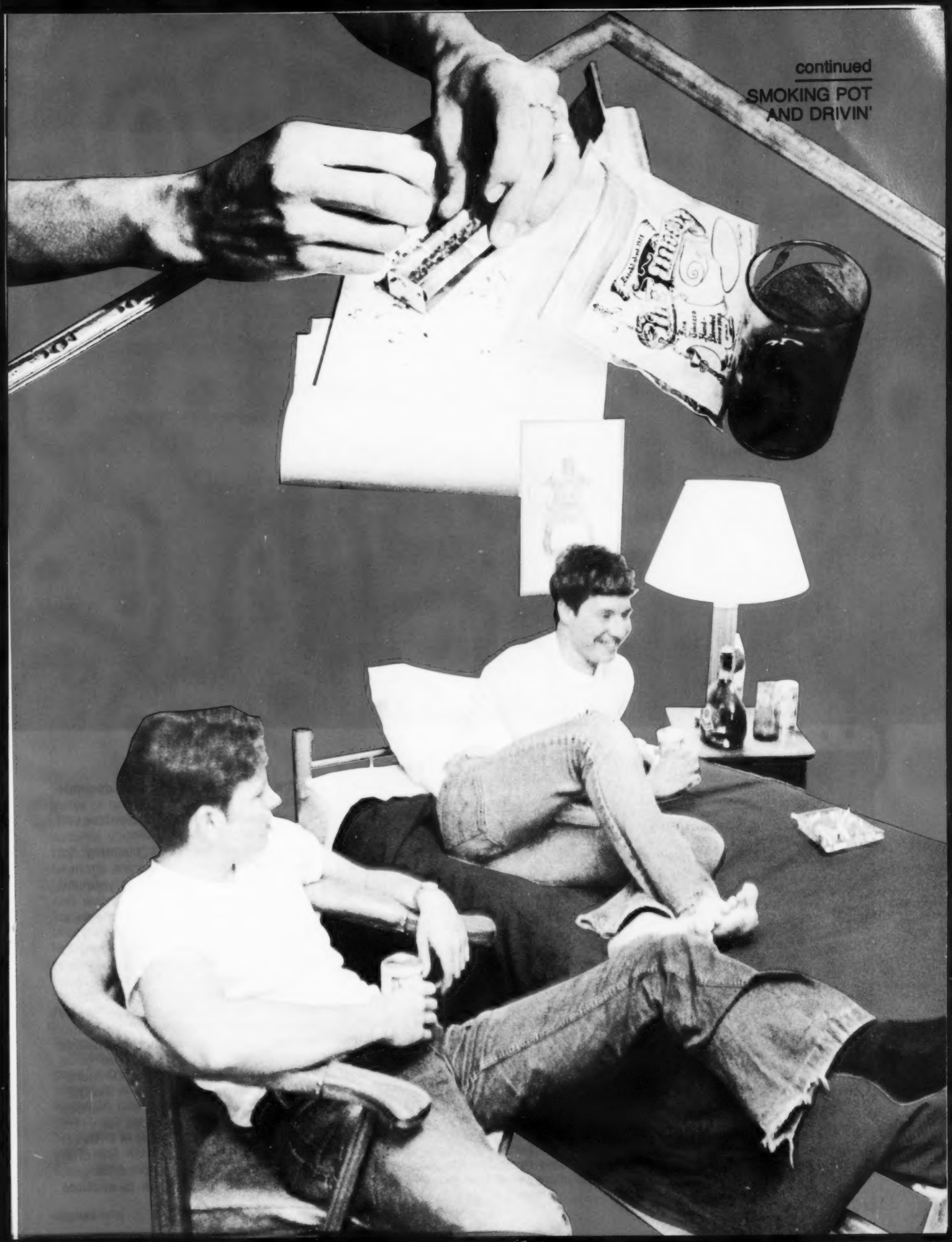
San Francisco's popular Haight Ashbury *Freepress* summed it all up in an editorial: "If doing your thing involves vegetating or becoming so dependent on any stimulant (booze, drugs, religion) that you are unable to function as a human being, then it appears that someone, somehow, should have a right to restrain you. We would not like to have the job. We would not like to say when you have gone too far.

"Doing your thing should be considered as a contribution to the welfare of yourself and your fellow man. If it does not do either of these, it would appear to be a bummer."

Military drug abuse leaders are concerned about pot-smoking service personnel who do a couple of numbers during their lunch period and in early evening hours after getting off work, then climb into their cars or on motorcycles for a drive. The reduced perceptual ability caused by a single joint or dooby can cause gross errors in judgment behind a steering wheel.

The simultaneous use of alcohol and marijuana before driving poses a threat that probably exceeds that of either substance alone. The Department of Health, Education and Welfare recently recommended to Congress that studies be made of the effects on the performance of pilots as well as drivers.

(Photos in this story especially posed.)



HAPPINESS IS

Only a few places on standard highway maps are unreachable—that's the beauty of RVing today! From the primitive splendor of the Alaskan Yukon to the jungle ruins of Yucatan and hundreds of thousands of points in between, depending on the type of *recreation vehicle* you're driving or pulling, North America can be your year-round campground.

Approximately 17½ million Americans now use seven million recreation vehicles—20 times as many RVs as just 15 years ago. Except for 1974 when the global gasoline crisis caused a sharp recession in the RV industry, the total manufacture of new RV units has been spiraling dizzily upward—15% last year and 25% more projected this year.

That many people on the highways and byways in travel and tent trailers, truck campers, vans, and motorhomes obviously mean problems for the naive and unprepared. How well you can hang in there if you're an RV buff depends primarily on four factors:

1. Your choice of RV and/or tow unit for the trips you want to take;
2. Adequate all-round planning for each trip;
3. Mechanical condition of your RV before departing; and
4. Attention to driving and consideration for others along the way.

The wisest step in buying a new or used RV is to get all the experience you can by first borrowing or renting several brands and types and talking to lots of owners. We can't say enough about the importance of picking an RV manufacturer and dealer who not only deliver a quality product but also give good after-sale service. There are 500 manufacturers and 15,000 dealers in the U.S. and Canada to choose from, and chances are you'll need their services for years to come. (The June '76 issue of DRIVER describes how to select an RV unit, various types available, price ranges, financing, renting, and how to evaluate

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Sales of recreation vehicles are mushrooming and there are more than a million campsites in North America

YEAR-ROUND RVing

your present car or truck for towing a trailer or hauling a camper.)

Experienced RVers all say *don't assume* your RV is ready to roll if you buy it *new*. Check to be sure wheel bearings are packed; hubcaps mounted securely; tires inflated accurately; gas and water line connections tightened; turn signals, brake lights, and electric brake controls hooked up correctly; pilot lights adjusted; and miscellaneous screws and nuts tightened. Also be sure to get all operating and maintenance manuals, guarantees, and warranties not just for your RV but also for its various equipment, appliances, and accessories.

When it comes to trip planning, your greatest problem may be deciding where to stop each night. There are about 15,000 private and public parks with 1 million campground sites open to RVers in the United States, 3,000 parks and 250,000 sites in Canada, and 250 parks and over 10,000 sites in

continued

More and more RV owners are mounting bikes of all sizes on the front or rear or both ends of their vehicles. Blocking off head or taillight beams can bring a traffic citation, however, as this RVer may discover if he travels after dark. Front wheel of bike almost obscures left front headlight.

HAPPINESS IS

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Towing a car behind your RV as a second source of transportation is a gas-saving good idea, but doing it safely requires first-class towing equipment and regular checking along the way. This motorhome owner winches the front wheels of his small import off the ground through the use of braces bolted to the car's front axle.

Mexico. A good RV campground directory like *Rand McNally's* (about $3.75), *Trailer Life's* (about $5.65), or *Woodall's* (about $6) can be invaluable in planning both short and long trips, and they all contain lots of travel tips.

There are numerous laws governing travel trailer operations in various states and countries; unfortunately, they're still not uniform. Your best bet before an interstate or out-of-country trip is to contact your local auto club for the latest rundown. Don't forget that it not only is dangerous but also against the law in most states to permit passengers to ride in a towed trailer (except fifth wheelers). The fine for a violation is usually substantial.

It's against the law in many states and Canada to leave gas pilots (especially on stoves) lighted while traveling, even in motor homes. Some states also prohibit you from driving through tunnels or across bridges if any pilots are lighted. Several RV explosions and deaths occur annually in the U.S. during stops at gasoline service stations. During the refueling operation, fumes can drift into a vent on the outside of the RV. If the pilot's on—KERBOOM! Take heed: If the fuel tank opening on your RV is located near a propane/butane vent or open valve, turn off all pilots and valves.

Smart RVers who want to prevent an explosion and fire from ruptured gas lines inside their RV following a collision or other accident can buy an excess-flow or check-valve which fits on an LP tank or between the tank and its flow regulator. Rego Manufacturing Co. of Chicago, IL 60646 markets several types ranging in price from $4 to $30, depending on size, materials, and application. They're already required in Canada, and the Recreation Vehicle Industry Association (RVIA) expects such valves to be legally required on all existing gas-equipped RVs in the U.S. in the not-too-distant future, thereafter to be standard equipment on all new RVs. Some RV manufacturers already are providing them, e.g., Xplorer, Travco, Swinger-Wicks, and Journey.

Another anti-explosion and fire prevention device that RVIA says may soon be mandatory for all gas-equipped RVs is an automatic stop-fill valve to prevent overfilling of any kind of LP tank already partially filled with vapors. The inventor, Brown Manufacturing Inc., of Bedford, IN 47421, says the Triple-L Control is UL-approved, permits any untrained person to fill an LP tank without danger of overfilling, and sells for about $11.

Don't overlook two of the most common causes of accidents involving travel trailers and pickup campers—failure of the suspension system due to overloading and/or improper weight distribution, and tire failure due to incorrect inflation pressure. The National Highway Traffic Safety Administration recently appealed to all travel trailer operators to inspect their rigs carefully on these points before going anywhere. The federal agency said its surveys indicate 59% of all RV trailers carry tire pressures below the trailer manufacturer's recommended maximums, and 34% are loaded beyond the rated capacity of the trailer suspension systems.

Speaking of accidents, make sure you have adequate collision, liability, and personal injury insurance before you start any trip. Some states have special minimums, e.g., New York, while insurance is a whole new ball game in Mexico and requires additional coverage if you drive more than 40 or 50 miles below the border.

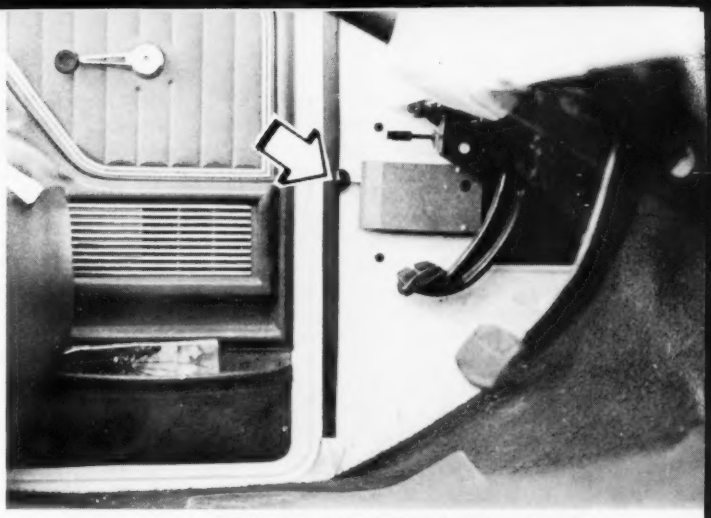
OK, if you've carefully checked out and prepared your rig according to our 25-point "pre-trip physical examination" starting on page 18, it should be ready to roll. Make a visual inspection of all brake lights, turn signals, running lights, and headlights (high and low beams); adjust the big mirrors on both sides of the cockpit according to your seat position; and start forward slowly.

Vehicles with automatic transmissions can be started in "Drive." It frequently is a good idea, however, to start in the next lower gear to avoid lugging the engine should the transmission automatically shift itself into "Drive" too soon for the load weight, engine temperature, or road conditions. Don't forget to move the lever back to "Drive." It is also a good idea to shift down manually when pulling a grade rather than wait for the transmission to shift itself. This causes the engine to lug and overheat. Shifting down increases the rpm, and the engine runs cooler.

Always look TWICE, both to the left and right, at intersections. Side mirrors often hide other vehicles from the driver's view. Signal before moving out from a curb or changing lanes. Check your mirrors frequently to observe traffic on both sides, being especially alert for motorcyclists. Because of their small profiles, cyclists can sneak into your blind spots suddenly and maybe disastrously should you have to make a quick lane change or turn a corner.

Watch your speed, especially in a motor home. As in a car, the old speedometer needle tends to creep up without your being aware. Because they have a lower center of gravity (CG), however, motorhomes usually handle better than other RVs, especially in high winds. Although highway traffic officers may warn you when winds are too strong to operate an RV safely, you should know the limitations of your own rig. A 15 to 25 mph wind may be gusting 40 to 70 mph or more. Campers, trailers, and some vans are especially vulnerable in high winds, and the best advice to any driver is to park and weather it out. A sudden gust can make instant kindling wood out of a $25,000 RV.

Motorhomes come in a wide selection of models from RV manufacturers, but many enthusiasts prefer to convert existing vehicles to their own needs like this Volkswagen. Once a lowly bug, it's now a proud mini-home strutting around with the big boys. No vehicle should be customized, however, without physically compensating for changes in gross weight, size, and center of gravity, all of which can affect its durability and handling characteristics.



Protecting your knees in the event of a collision is the object of this idea for mounting the control handle to the electric trailer brakes (arrow) on the sidewall of the foot pedal area instead of under the dashboard. The tow vehicle is a Ford Ranger XLT pickup.

Drivers of campers and motorhomes with dual rear wheels should run one or two more pounds of air pressure in the outside tires. When winds blow, the weight will shift to the harder tire. But no matter what kind of RV you're driving or pulling in windy, rainy, snowy, dusty, foggy, or smoggy weather, slow down and remain alert, keeping both hands on the steering wheel in the 10 and 2 o'clock position.

Be sure to make allowances in your driving habits for your RV's extra height, width, and length. Every RVer should measure his vehicle's exact height when it's unloaded, has no water or LP, minimum fuel, and its lightest driver is in the cockpit. Don't forget to allow for the roof air conditioner, TV or CB antenna, luggage rack, and air vents. Be particularly careful when you enter enclosed parking lots or gasoline service stations. Some older stations have low roofs, and a whip antenna can wipe out the overhead fluorescent lights in the ceiling.

Don't take pets on trips unless you're mentally and materially prepared to care for them. Leaving a pet locked in an RV or tethered outside for even brief periods can be cruel. Conversely, letting it run loose in a park or campground can be dangerous and a nuisance.

Always count noses before driving away in your RV. Unwittingly leaving a child or pet behind can be a traumatic and dangerous experience for everybody.

Last but certainly not least important, let a responsible party back home know your daily itinerary in event of an emergency need to contact you.

There you have it. If you've filled each of our four squares for successful RVing, you should experience a safe, happy trip free of breakdowns, mishaps, and unanticipated expenses. Next year, you'll be one of the pros who RVers like yourself turned to for advice this year.

continued

All-important to a travel trailer's external lighting system is the all-weather DC-power socket generally located near the bumper of the tow vehicle. Malfunctions of brake, turn signal, four-way flasher, and running lights often can be traced to sand inside the receptacle, corroded contact points, or loose leads.

An advancement in mirror technology is Velvac's four-mirror system, two of which are seen on this pickup camper. The top is a modified, west-coast type plane mirror, while the bottom one is a six-inch square, gently convex model that can be angled by the driver to fill in nearly all blind spots to his rear with only minor distortion. When paired with matching mirrors on the opposite side of the cab, these types are said to be superior to and offer less distortion than the more common "bullseye" mirrors stuck at the top or bottom of conventional plane mirrors.

"PRE-TRIP EXAM" FOR REC VEHICLES

Every type of RV and tow vehicle should receive a careful "pre-trip physical examination" and one or more trial runs prior to a longer trip. This will give you a chance to spot and correct those bugs that are so bothersome (and often expensive) once you get underway. Here's a year-round checklist, especially for rigs that have been stored or parked or uninspected since the last big outing.

1. Get a good tune-up if necessary. It may cost a few bucks but the gas savings, a cooler running engine, more power on hills, etc., are worth it.

2. Get a thorough lube job and change oil in the crankcase according to the manufacturer's recommendations. Don't forget a new oil filter. Make sure the PCV valve is clean and replace the air cleaner on the carburetor if necessary.

3. Have your automatic or manual transmission checked out and replace the transmission fluid (every 10,000 miles). Failure to change fluid often enough is the MAJOR CAUSE of transmission breakdowns and overhauls.

4. Flush out the radiator if necessary and put in new radiator coolant if unchanged since last summer. Also, take along an extra gallon or two of coolant for emergencies. Inspect the radiator fins for bugs and mud that can rob cooling efficiency. The cooling system should be warm and under pressure when you check hoses and clamps. An older radiator may need rodding out, a good investment against breakdowns later.

5. A professional check of the air conditioner, including a test for leaks and a freon coolant recharge, is an inexpensive must.

6. Have all wheels packed with new grease, especially if they haven't been packed since last summer or if you live in snow country. Salt and moisture reduce the protection of wheel bearing grease. Check out brake drums and linings at the same time. The brakes may also need adjusting. Have a knowledgeable mechanic check electric brakes on trailers.

7. Inspect all tires, including spares, for tread wear, cracks, damage, irregular wear, and adequate pressure. Look into tread grooves for splitting. Tighten all lug nuts—on new RVs, too. Know your gross vehicle weight (GVW).

8. Check water levels of all batteries and, if low, refill with distilled water. Carry a hydrometer to check cell conditions. Clean off terminals with baking soda and coat lightly with petroleum jelly. Don't start a trip with a battery on which the guarantee is about to expire.

9. Test all exterior light bulbs, especially brake and turn signals/4-way flashers. Dim or dead bulbs are often caused by corrosion in the socket. Clean contact points with fine sandpaper or replace bulbs as necessary. Most inside light fixtures and switch malfunctions can be corrected simply by tightening connections.

10. Don't be afraid to crawl under your rig occasionally. If it's equipped with skids, check them out; they often work loose. Also inspect the shackles, shackle bolts, leaf springs, and hold-down straps for water and holding tanks.

11. Check the operation of all appliances, including pilot lights. Clean the range and oven burners, then recheck the pilots. Remove exterior vents and face plates from refrigerator units and water heaters and check for spiderwebs, bird nests, loose insulation, lint, and possible damage.

12. Check butane or propane gas line fittings frequently for leaks with a soapy solution (or commercial tester). If either bubbles, there's a leak. Have your LP-gas supplier run a pressure

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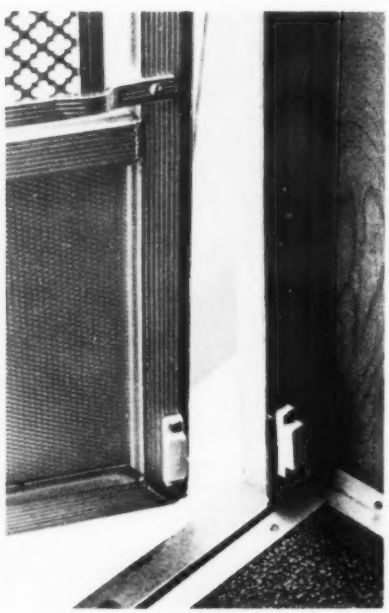
HAPPINESS IS YEAR-ROUND RVing



Burglar-proofing your RV is just as important as it is for your home. One inexpensive ($20), homemade, open circuit system includes a magnetic switch inside the door (left) of an Airstream travel trailer. The alarm, a loud siren built into the sewage hose box, can be activated either when an intruder opens the door, thereby closing the circuit, or manually by an occupant pushing an easy-to-reach button inside the trailer. The owner points to a relay (right) installed to keep the siren circuit closed when it's activated, while the whole system is turned off and on by a toggle switch located inside the locked external access door to the trailer's refrigerator.

test on the entire system while he's topping off the tanks. Leave the regulator on the tanks alone; it's set at the factory for the proper pressure.

13. Clean out your RV's holding and water tanks periodically, using a cleaner recommended by the manufacturer for your particular toilet. A solution of baking soda and fresh water can be added to the water tank (one pound for 20 gallons). Let it stand for an hour and drain. One refilling usually is sufficient.

14. Inspect the area around pumps and water tanks for dampness or dry-rot. Tighten all water hoses and pump connections; clean the filter and check-valve; and snug up all screws on the pump (a major cause of pump malfunctions).

15. Go over the exterior of your rig for loose screws and nails, and inside cabinets, too. If your RV is a year old or more, you'll probably find quite a few.

16. Painted areas on the outside of your RV that are flaking or rusting should be wirebrushed or sanded down, treated with a rustproof primer (zinc chromate), and painted. Bare metal areas under your RV or tow vehicle should be treated with protective undercoating (available in spray cans). You can extend body life considerably by steam cleaning or washing the entire underside, paying particular attention to fender wells and areas where road salt and mud collect.

17. On trailers, motorhomes, and long pickup campers, inspect the underside of the rear overhang for damages from dips, driveways, and boulders. Look for bent and broken parts, loose fittings, open joints, and exposed metal or wood. Repair as necessary.

18. On pickup campers, carefully check the brackets and bolts that hold the camper jacks, tie-downs, and stabilizers. Remove stabilizers and check for firmness. If they slide up and down easily, they probably need replacing.

19. Folding tent campers and pop-tops should be checked for any mechanical malfunctions and lubricated as necessary. Inspect canvas for tears, rips, rot, and broken zippers. Lube zippers with beeswax, silicone, or soap.

20. A loaded trailer weighing 1,500 pounds or more or 40% of the weight of the tow vehicle should have its own electrically-controlled brake system, so don't take it out on the highway unless it does. A Class II or III trailer should also be towed with a load-leveling hitch and anti-sway bars.

21. Always check out independently operated electric trailer brakes and the manual control unit in the tow vehicle by a test drive before any trip, even with a new trailer. Every trailer with electric brakes should also be equipped with a break-away switch and safety lanyard to automatically activate the brakes in event of emergency separation from the tow vehicle. While safety chains are required in most states on all trailers, many states still don't insist on break-away switches.

22. Test all fire extinguishers and make sure all persons old enough know where each one is located and how to operate it. Hand-held, portable extinguishers, preferably multi-purpose, A-B-C models containing at least 2 to 2½ pounds of dry chemical are preferred. Mount one each in your RV, tow vehicle, power boat, and off-road vehicle (but not in the trunk because it usually cannot be opened after a rear-end collision).

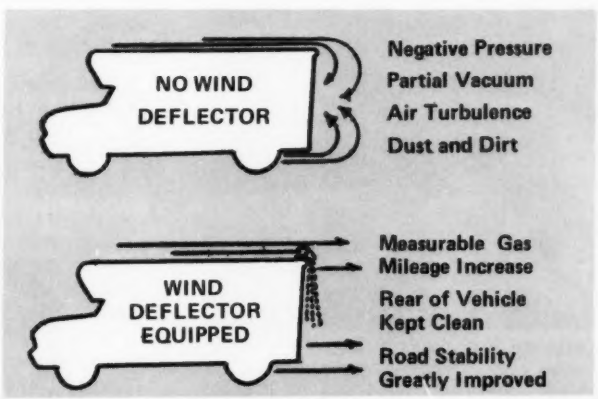
23. In loading your tow vehicle, camper, motorhome, van, or trailer, load the cargo slightly toward the front; heavy rear loads induce fishtailing. Overloading also is dangerous—don't put a one-ton camper on a half-ton truck or load your trailer or motorhome beyond the rated capacity of its suspension system.

24. Do not overinflate RV tires to compensate for heavier loads. Maximum inflation and load capacity figures are molded into the sidewalls of new tires, and all RVs built since 1972 list gross axle weight ratings on a label attached near the driver's seat. Divide the number of tires on the axle into the weight rating to determine the load each tire must carry.

25. Radial tires should never be used on RV trailers unless tire and vehicle manufacturers specifically recommend it. Radials should never be put on the same axle with bias or belted-bias tires.

continued

Smoother handling characteristics, especially at higher speeds, are credited to wind deflectors mounted on roof tops of vehicles towing travel trailers. The gas savers, most of which fold up for easy installation and removal, are available in metal, heavy plastic, and wood models and cost from $30 to $50. The aerodynamic benefits achieved by deflecting air up and over a trailer have been proven in wind tunnel tests.



Wind deflectors offer several benefits to RVs, but the main one is improved gasoline mileage, up to 3 to 5 mpg, both manufacturers and users claim. The above drawings illustrate how a deflector installed at the top rear edge of an RV directs air flowing over the roof downward to the immediate rear of the vehicle, breaking the vacuum, and releasing the RV from dragging a huge ball of air turbulence down the highway. Easily installed, it comes in 4-, 6-, and 7½-foot widths selling from $16 to $28.

continued

HAPPINESS IS YEAR-ROUND RVing

Obtaining pure water on RV trips is a must for good health, and Navy Captain Edward J. Carlson (Ret.) of Oakland, CA, solved the problem on his trailer by buying a carbon filter unit (available at Sears and Ward stores for about $10). He then made a special bracket and mounted it inside the rear bumper near the trailer's fresh water connection.

Fishing enthusiasts who carry small boats atop pickup campers and other flat-topped vehicles often encounter installation problems with consequent dangers from wind buffeting. Illustrated here is one RV owner's answer to an easier way to mount a boat.

? ? ? DON'T FORGET! ? ? ?

- Tire pressure gauge and tire pump.
- Quarter-inch hex wrench or socket for tightening sheet metal screws on your RV.
- Complete set of extra belts for radiator fan, generator/alternator, and air conditioner(s).
- Heavy-duty jack, preferably hydraulic, for flat tires on your RV; X-shaped wrench for better leverage on lug nuts; and several short lengths of 4x4s and 2x6s with 60-degree ends for chocking wheels, RV leveling, and jacking foundation.
- Extra electrical system fuses for both RV and tow vehicle.
- Heavy-duty male and female, two- and three-prong service plug adapters for 110-volt electrical hookup outlets along the way.
- Spare bulbs for external running, stop, and turn signal lights in each of the various sizes required.
- A couple of different-size, adjustable clamps for pressure hoses.
- A 30-inch length of fuel line of a diameter matching your vehicle's fuel pump.
- Tool kit with at least basic tools, including several sizes of Phillips and blade screwdrivers.
- Tow strap or chain.
- A few quarts of motor oil, quart of transmission fluid (buy the correct type for your make of vehicle – also useable in power steering units), a pint of brake fluid, and a bottle of windshield washer fluid.
- Day-night roadside emergency reflectors and several long-burning flares (don't store near vehicle's gas tank).
- Lightweight grease for ball joint hitches and tension bars (use sparingly). A small aerosol can of white lubricant costs about a buck and isn't so messy.
- An adequate supply of biodegradable toilet tissue if your RV unit is self-contained, and a good quality cleaning/deodorizing solution for the sewage holding tank.
- A pressure regulator for your RV's external fresh water connection.
- An adapter cap for fastening a rubber hose to your RV's waste water drain pipe, and a covered bucket for it to drain into when there's no sewer connection or space to dig a "gopher hole."
- A good supply of table candles for nighttime power failures.
- A box of long fireplace matches to ignite pilot lights when the flint and steel devices let you down. Also a package of extra flints.
- Extra fresh water containers; also a 2- or 3-gal utility pail and sponge for cleaning up spills, mopping water from the bottom of the shower enclosure, and washing your vehicle.
- Family-size first aid kit.
- Extra windshield wiper blades and car keys.
- Vehicle registration(s), driver's license, auto club ID card, road maps, and litter bags.
- Universal handle for those frustrating outdoor water faucets along the way from which the handles always seem to be missing.

TIMELY TOPICS

Manual UPdates

A new Mitchell Manual titled *Service Center Handbook* has been coded into the Department of Defense master data file and assigned National Stock Number 7610-01-017-3552 ($24.95).

If you are using Mitchell Manuals in your Hobby Shop or other operation, you will be interested in the national stock numbers for the 1976 supplements:

- **Automotive Emission Control:** NSN 7610-01-017-3551 ($11.50)
- **Automotive Air Conditioning-Heaters:** 7610-01-017-3550 ($11.35)
- **Annual Update for Basic National Service Data Set for Cars:** 7610-01-017-3421 ($20.00)
- **Annual Update for the Basic Light Truck National Service Data Set:** 7610-01-017-3420 ($26.00)

HELMETS AND HEARING

Among the motorcyclists who object to wearing helmets are some who maintain that the helmet interferes with vision and hearing. NHTSA (National Highway Traffic Safety Administration) has started research into this matter and has so far completed two studies.

The vision study tested four different styles of helmets to measure restriction to the rider's field of view. All helmets tested exceeded the minimum state licensing requirements of 140 degrees total peripheral (side) view in the horizontal plane, and all were in general compliance with Department of Transportation standards.

The research on hearing restriction studied the relationship between sounds of interest to the rider and the noise created by the bike itself. The key factor was whether the rider could hear a sound of interest despite the masking sound generated by the motorcycle. Because helmets reduce the loudness of both the specific sound and the motorcycle noise equally, helmets have an inconsequential effect.

NHTSA is also conducting research into the claim that helmet use results in increased neck injuries from motorcycle accidents. There is as yet no evidence that neck injuries in crashes are caused by the use of safety helmets. The 1969 New York study so widely publicized showed increases in neck injuries and fatalities a year after the New York helmet law went into effect, but these constituted only 1.6 per cent of all cycling injuries that year, and most of these were in the "complaint of pain, no visible sign" category.

NEW CATALOG

The Summer 1976 edition of *Consumer Information* is now available free of charge from the Consumer Information Center, Pueblo, Colorado 81009. This is a catalog listing more than 240 Federal consumer publications. It includes booklets on a variety of consumer products and consumer-interest subjects, ranging from automobiles to home maintenance. These booklets are either free or sell for a very small amount.

RECALLS

CARS—Chrysler Motors Corp., Detroit, MI, announces the recall of approximately 8,310 1975 model Plymouth Valiant Dusters and Dodge Dart Sport passenger cars manufactured between January and February 1975 because the cars could lose their front braking power. According to the manufacturer, the left front braking tube on these cars may be improperly routed, allowing the tube and the brake hose to rub together. Resulting abrasion could cause hose failures and loss of front brake capability. The rear brake system is not affected.

What to do: If you bought one of these cars new, you will get a notification report from Chrysler telling where to take your car to be repaired. If you bought a used model and do not receive a recall notification, you can contact your dealer to find out if your car is one of the affected vehicles. Tell your dealer your inquiry involves Recall Notification Campaign No. 212 that was issued on 26 April 1976.

ABOUT MISS DRIVER

Claudia Mahin is a WAVE, U.S. Navy, stationed in San Diego. She is aiming for hospital corpsman rating and plans eventually to be a registered nurse. When she first learned to drive five years ago, she ran out of gas on the freeway, left the car unattended while she went for help, and came back to find the car had been involved in an accident. She's kept a sharp eye on the gauges ever since!

AIR CONDITIONERS

Those of you who are familiar with T.O.s know that during certain portions of any operation, there are little notes that read "caution" or "warning." Well, right up front, here's a *warning* about foolin' around with your auto air conditioner.

WARNING . . . THE REFRIGERANT USED IN AIR CONDITIONING SYSTEMS IS HAZARDOUS. YOU CAN'T SEE, TASTE, OR SMELL IT, AND IT CAN'T BE READILY DETECTED. THIS REFRIGERANT BOILS AT −21 DEGREES FARENHEIT AND CAN SEVERELY INJURE YOU BY FREEZING. ALSO, IF IT COMES IN CONTACT WITH A HEAT SOURCE, IT CAN CHANGE FROM A LIQUID TO A HAZARDOUS GAS.

Now that we've got the dire warnings out, let's take a look at your car's air conditioning system to see how it works, and maybe we can clear up a few malfunctions.

OPERATING THEORY

An air conditioning (A/C) unit works on the simple principle that when a liquid is converted to a gas, it absorbs heat from its surroundings. Using an immense amount of logic, we see that when it's reconverted from a gaseous state back to a liquid, it gives up this heat.

In order to accomplish this feat of heat removal, we need several components. They are the compressor, the condenser, the receiver, the expansion valve, the evaporator unit, and associated hoses and fittings.

As we go further into the a/c's operation, remember that what the a/c does is *remove* heat from the passenger compartment, not add cold. The first step in this chain is the compressor.

The compressor is nothing more than a pump which is driven by the crankshaft via a V-belt. It picks up a gaseous refrigerant from the evaporator inside the car and compresses it. Let's refer to this refrigerant (Freon) as R-12. The compressor uses an electro-magnetic clutch to permit it to be turned off when not needed.

The R-12 is metered into a cooling coil (evaporator), normally located inside the car on the firewall, at about 30 psi. The R-12 is in liquid form at this point. Its boiling point at 30 psi is just above the freezing point of water. The R-12 therefore tends to boil, absorbing heat from the coil.

A blower forces either inside or outside air, depending on the setting, through the evaporator. The air then passes into the passenger compartment through those little grilles (you know the ones we mean . . . those little grilles that no matter where you aim them, they still blow ashes from your cigarette or ashtray all over the car). As the air passes through the evaporator, heat and moisture are removed.

The R-12 boils inside the evaporator and then passes into the compressor, as a gas, where its pressure is increased. R-12 pressure as it leaves the compressor is usually 200 psi.

The R-12 then enters the condenser, a heat exchanging coil resembling a radiator and usually located in front of the car's radiator. The high pressure caused by the compressor is put to work at this point and raises the boiling point of the R-12 to over 150 degrees F. When outside air is passed over the thin tubes and fins of the condenser, it cools and changes the R-12 back to a liquid, losing the heat it picked up from the interior of the car.

The liquified R-12 then enters the receiver (dryer), a small black tank located next to the condenser or on one of the fender wells. This unit has the job of separating liquid refrigerant from any gas that might have left the condenser, and also filters the refrigerant and absorbs any moisture it may contain. It incorporates a sight glass, in most systems, that allows the R-12 to be visually checked for the presence of bubbles. Remember this sight glass . . . it's invaluable in troubleshooting a/c problems.

R-12 then flows through a liquid line to the expansion valve. This valve is usually located near the evaporator, and usually on or near the firewall. The valve, shaped like a mushroom on some aftermarket systems, controls the flow of R-12

to the evaporator. It provides only the amount of flow that the evaporator can handle.

SYSTEM TROUBLESHOOTING

CHECK COMPRESSOR BELTS . . . Inspect belts for cracking, fraying, or glazing. Glazing can result from, and result in, slipping. A glazed belt will have a smooth, slippery surface where the belt contacts the pulley.

If the belt needs replacing, do so, being sure you use only the belt specified in your owners' manual. If your compressor is driven by multiple belts but only one is bad, replace both. Belt sets are exactly that . . . sets.

A. Replacing belts: Loosen the mounting bolts of the compressor and move the unit toward the fan so that the new belt may be installed without prying. Check first though, to see if you can replace the belt by loosening the idler pulleys instead of the compressor.

Tighten the belt by pulling the compressor away from the fan, prying it *carefully* with a breaker bar or, if the mount has a square hole, by applying torque on the mount with a socket drive.

Belts should be tightened so that there is no slack and so that they have a springy feel. Moderate thumb pressure should cause the belt to yield ½ to ¾ inch for each 10 inches between pulleys. Tighten new belts slightly more to allow for belt stretch during break-in.

If the belts continue to slip, or are noisy, chances are that either the pulley is worn beyond limits, or you have the wrong belt.

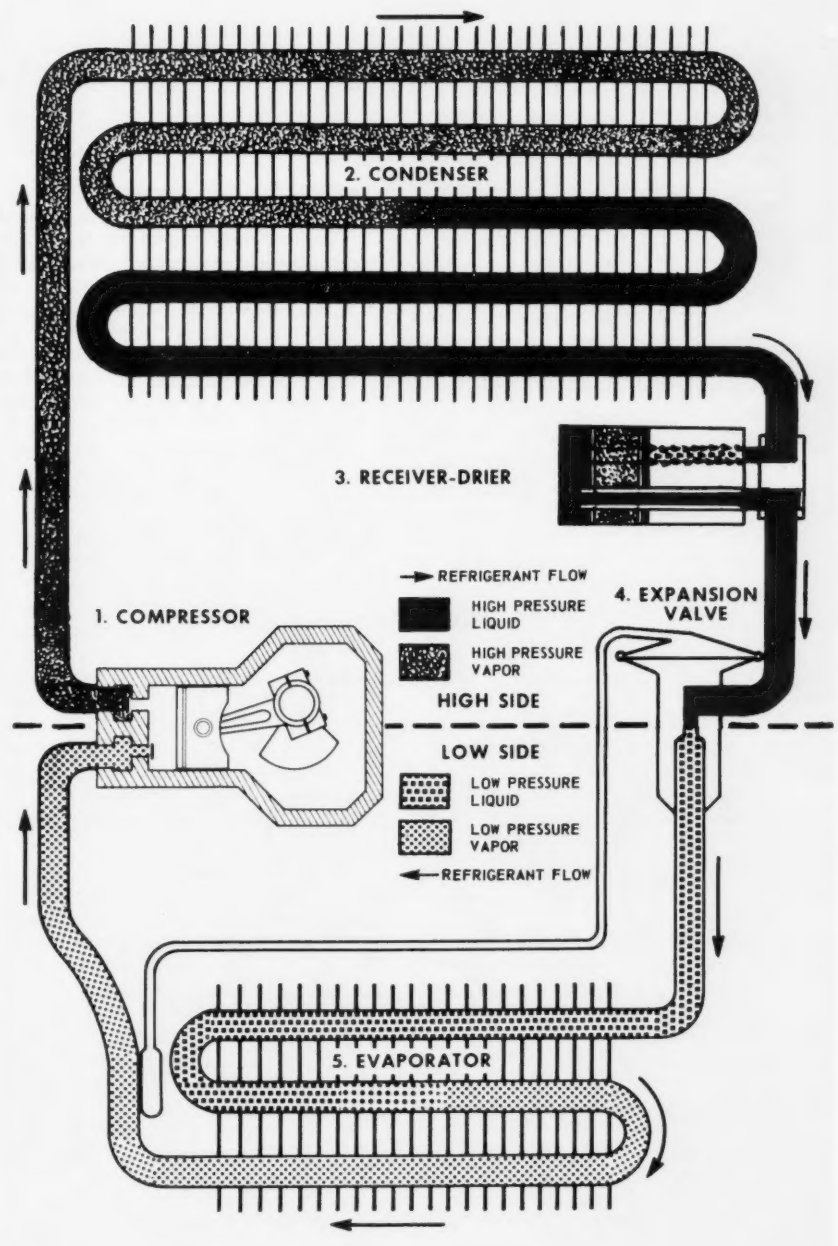
B. Check compressor operation: The front portion of the clutch should remain stationary when the compressor is disengaged. If this portion of the clutch turns with the belt, the compressor is operating. With the a/c selectors switches "on," the clutch should be turning.

If the compressor is not running, be sure all a/c controls are set on full or max. Also consider that some of these lil' devils won't go on if the outside temperature is below 50 degrees F. If all switches are set and the weather is warm, the compressor should operate at least intermittently.

If the clutch still fails to engage, pull the wire that goes to the clutch and check for voltage with a voltmeter. If voltage is present, the clutch is faulty and must be replaced. If there is *no* voltage, trace the wiring back toward the ignition switch. If the wire leads to a frammis located on the receiver or firewall and electrically connected to the compressor, assume the frammis is a low-refrigerant protection switch. If you have voltage on the ignition side of the switch but not on the compressor side, the R-12 is low.

continued

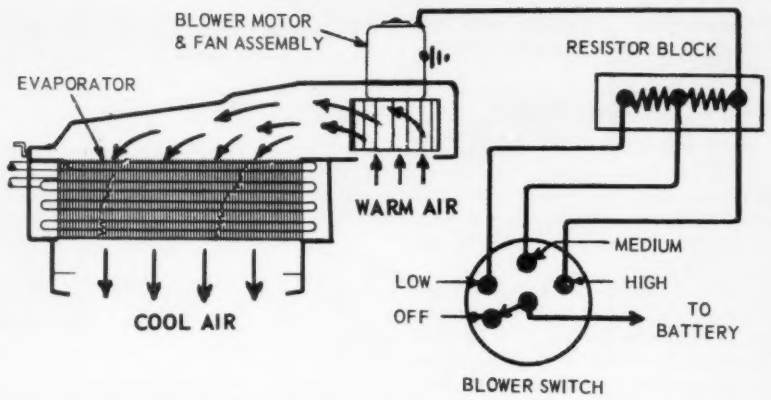
Basic refrigerant (R-12) flow cycle



If voltage is present at the compressor side, check wiring and connections back to the ignition switch. Check for a blown a/c fuse in the fuse block, or an inoperative thermostat (usually located behind the temp control knob).

C. Inspect condenser and fan: Check condenser for bent or damaged fins, and FOD. Straighten the fins as necessary, but be careful not to damage any of the tubes. Check the fan for bent blades or wobbling, and insure that it is not slipping due to worn belts. Remember that cooling system malfunctions can cause the a/c to function badly.

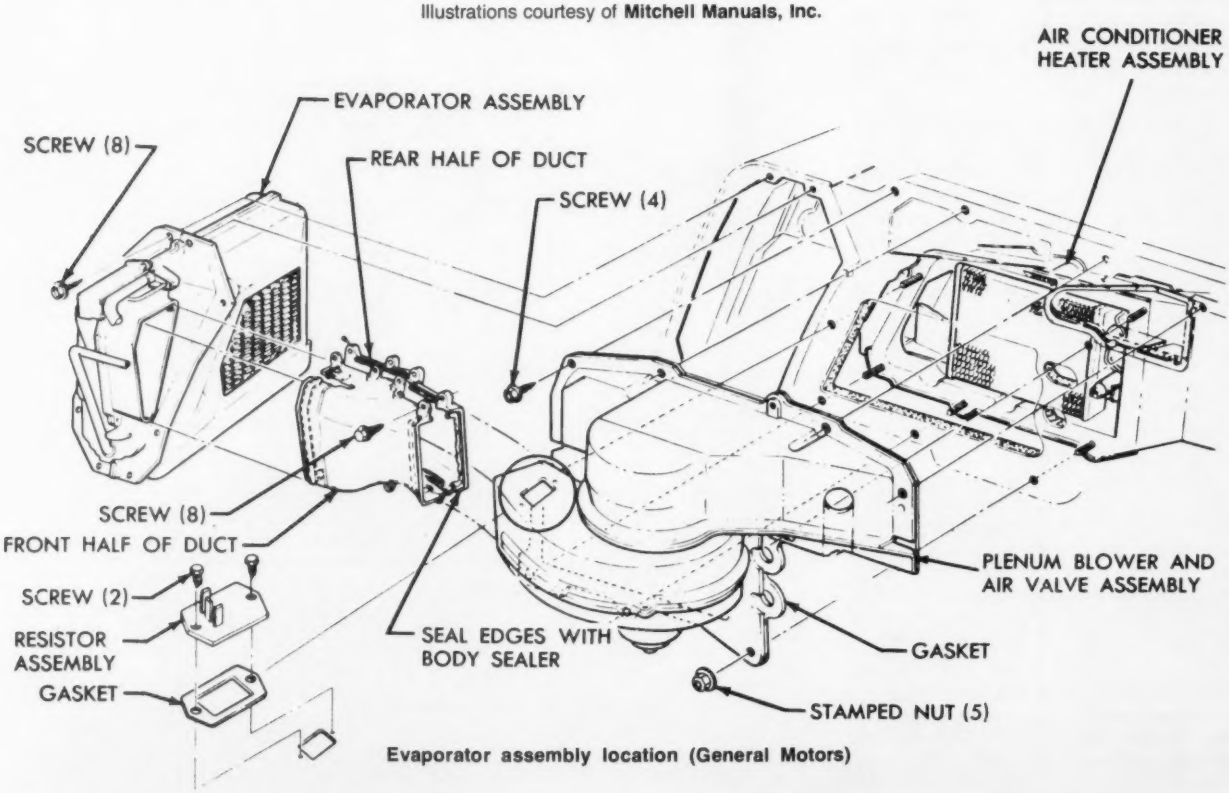
D. Leaks: R-12 leaks show up as oily film or substance on the various components because compressor oil is carried around the entire system along with the refrigerant. Look for oily spots on hoses and lines, and at joints. A small amount of oil on the front of the compressor is normal.



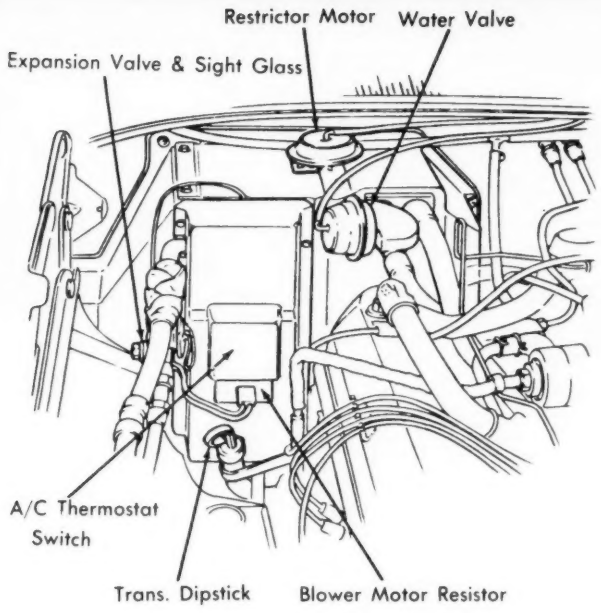
Blower motor and fan operation

NOTE . . . if you determine that your a/c is low on R-12 and wish to recharge it yourself with one of the kits on the market, please consider either having it done or asking your installation hobby shop for assistance. No matter what the labels on the kits say, you *should* have a gauge kit, a leak checker, and a purge kit to do the job right. By the time you've purchased two or three little cans of R-12 and the hose kit, you're only about three dollars away from the price most a/c servicemen charge to do it. An added benefit of having a pro do it is that he can evacuate and dry your system while he's at it for little or no extra coin. If you still want to do it yourself, check with the hobby shop . . . most of them have at least the gauge kits. Trying to put two pounds of R-12 in a system that needs only 9 ounces cannot only be frustrating, but possibly dangerous.

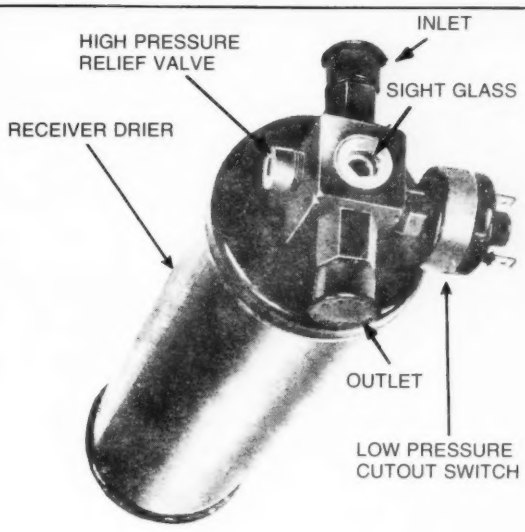
Illustrations courtesy of **Mitchell Manuals, Inc.**



Evaporator assembly location (General Motors)



Typical A/C component location (Ford)



Receiver assembly showing sight glass

E. Sight glass: Start the engine and adjust idle speed up or set the idle cam on a higher notch. Locate the sight glass and remove any covers, and clean it with a rag (if the receiver is near the fan, use caution to insure the rag doesn't get caught in the fan). Have someone set a/c blower and controls at max and watch the sight glass. The glass should foam and then become clear. Unless the outside temperature is less than 70 degrees, the glass should become completely clear within a few minutes. A few bubbles will be present at the cooler temperatures even if the system is operating correctly. If a few bubbles appear at warmer temperatures, it indicates the system is slightly low on R-12 and should be leak-checked and recharged. If you see severe bubbling or the glass remains completely clear from startup, the system probably is *very* low and needs a charge. If the glass foams and then turns clear, go on to G.

F. Line temperature: Carefully feel along the tube that runs from the condenser to the expansion valve. It may be hot, so watch it. The line should be warm along its entire length. A drop in temperature indicates a clog at the point of the temperature drop. If the drop occurs at the receiver, the receiver will have to be replaced because it is clogged with moisture or dirt.

The main suction and discharge lines at the compressor should show a definite difference in temperature, one hot and one cold. If they feel about the same and the sight glass doesn't foam even at startup, the R-12 charge is probably completely gone.

G. Blower performance: Operate the system with the blower at high speed and the temp control set at the coldest setting. Engine should be at fast idle.

The temperature at the discharge vents will vary with the weather but most systems will maintain a comfortable temperature in all but the hottest weather. Above 90 degrees, expect a slight reduction in cooling.

If the outside temperature is normal and the a/c performance is still below normal, suspect the blower or temperature control system.

If the blower operates on all speeds and changes its speed when the blower control switch is moved, it's operational. If it operates on only one or two positions or speeds, suspect a faulty blower resistor. This gem is located (usually) in the engine compartment on the evaporator housing. Remove it and check for burning or shorting coils.

If the blower doesn't function at all, run a jumper wire from the positive battery terminal or the fuse block to the blower motor terminal. If it still doesn't run, check the ground strap.

If the system output is inadequate, even though the blower is good, the temperature control system may be the glitch. Have a buddy move the temperature control lever back and forth while you look under the dash for a moving control cable (when under hood or dash, remove rings, watches, bracelets). The cable operates either a water valve or an air mixing door. If there is no apparent cable movement, but shifting the temp control knob has an effect on compressor operation, have the thermostatic switch checked by your friendly a/c serviceperson.

If the lever is moving an air door or water valve, inspect the linkage to see if it is operating properly. The most common problem is an incorrect adjustment or a slipping adjusting screw. The adjustment is usually made on the clamp which holds the cable in place. Adjust the cable's position so that the door or water valve will move to its fully closed or maximum position just before the temperature control reaches its max travel. Where a vacuum-operated water valve is used to stop coolant flow through the heater core at maximum cooling only, check the vacuum line to the valve. If the line is not cracked or kinked, have the valve checked.

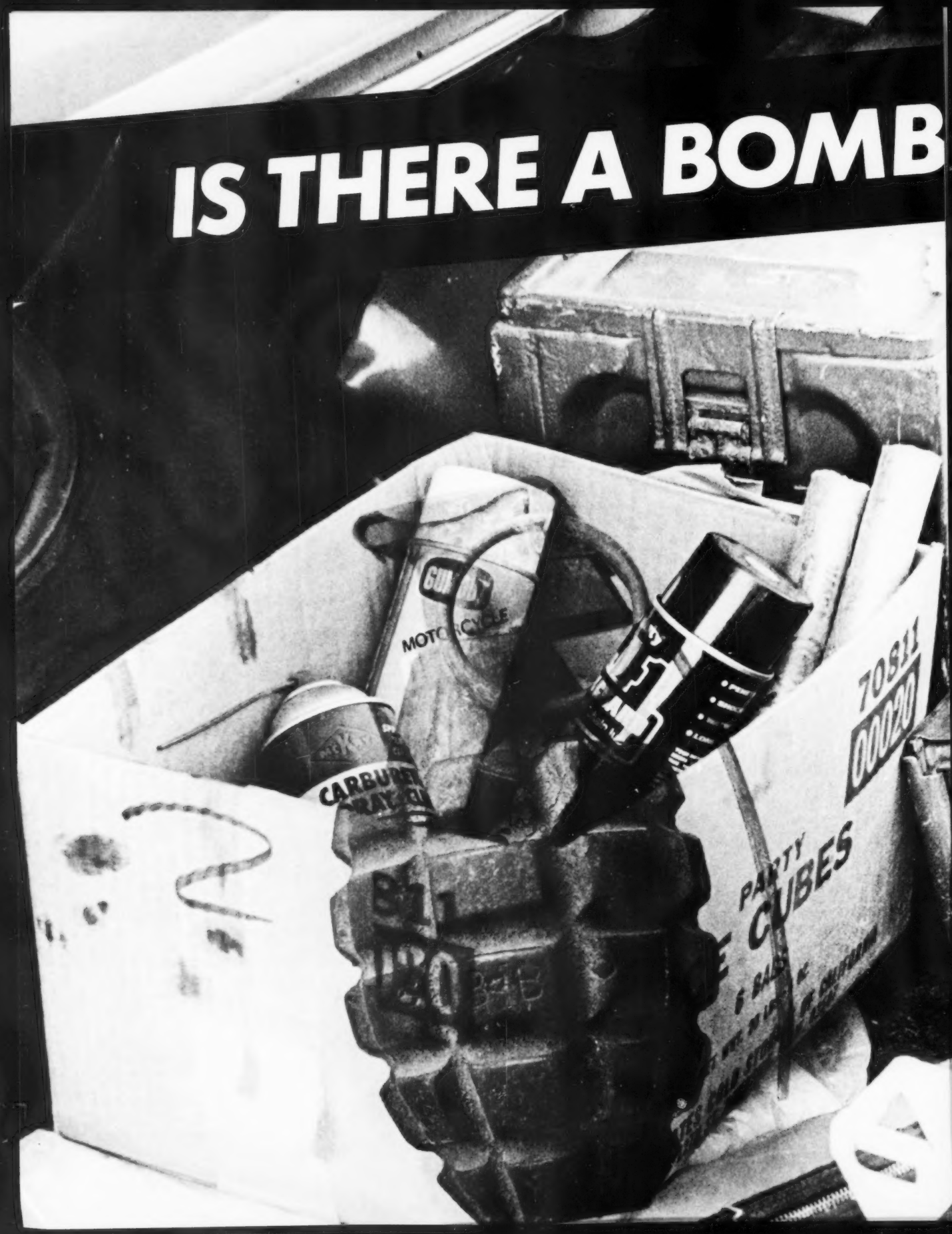
If the a/c works OK for 20 to 40 minutes and then begins to go away, the evaporator core is probably freezing up. The suction throttling valve or de-icing switch causes this and will have to be inspected or repaired by a qualified a/c person.

HOBBY SHOP?

Don't forget your installation hobby shop when you have a/c problems. Most shops have the a/c manuals you'll need, and many have skilled a/c technicians that can help guide you through the maze of wire and tubing.

Also, as with other Backyard Mechanic articles, we advise getting and using the correct shop manuals and safety equipment. A/C servicing can require safety goggles, insulated gloves, pressure gauge sets, and special pressure vessels and connections.

Don't be afraid of doing your own troubleshooting, but remember that major a/c repairs are best accomplished with a little qualified help.


IS THERE A BOMB
PARTY
CUBES

IN YOUR CAR?

by Capt Lawrence H. Hannon, USAF, Scott AFB, Illinois

Read the label on almost any aerosol spray can. "Caution: Flammable! Do not use near fire or flame. Contents under pressure." Users are further cautioned not to puncture or incinerate these dangerous cans nor to expose them to heat or store where the temperature goes above 86 degrees.

Too few people take the time to read this warning which appears on many commonly used products such as spray paint, lacquer, carburetor cleaner, insecticide, and hair spray.

Military Airlift Command safety experts at Scott AFB, Ill., know these cans will actually explode like a bomb when they get too hot. They know too that the propellant in these aerosol cans is highly volatile and will burst into flame when ignited by a spark, lighted cigarette, or fire.

Take the case of the welder at a West Coast Air Force base, who accidentally cut into an almost empty spray can of lacquer as he worked on an aircraft hangar door. The blast from just one small aerosol can was strong enough to damage the heavy metal door.

Safety experts find audiences are surprised by a demonstration of the potential danger of these aerosol bombs. Under carefully controlled conditions a short spurt of hair spray directed across a small flame flashes like a flame thrower.

Another example of this volatility was demonstrated when a lady allowed liquid hair spray to spew into the bathroom toilet as she attempted to clear a can malfunction. A few minutes later another member of the family entered the bathroom, sat down, lit a cigarette, and dropped the partially extinguished match into the toilet bowl.

The explosion that resulted was anything but funny. The man suffered painful burns on a particularly sensitive portion of his anatomy. Those embedded porcelain fragments didn't feel too good, either.

Paint in spray cans can also be dangerous. Numerous times improperly stored aerosol paint cans have either caused or contributed to a serious fire. One such fire at a Navy base caused $38,000 damage when a pressurized can of flammable liquid exploded. The cause? A gas pilot light touched off vapors which escaped from pressurized aerosol cans stored in a building which heated up on a warm, sunny day.

In another case, a worker placed a can of spray paint in a vat of boiling water "to loosen up the paint." About a minute later, just as he reached for the can, it exploded, blowing out both ends. The man was severely burned by the scalding water which splashed over him. He also was injured by shrapnel-like can fragments.

The critical factor in both of these instances was temperature. Manufacturers and safety experts recommend that these pressurized cans be stored in closed containers where the temperature remains below 86 degrees.

How much above this critical point does the temperature need to rise in order to create a problem? Well, apparently not very much as evidenced by this incident: A young man driving home from a shopping trip was injured slightly when a can of spray paint "cooked off" in his car. The can was in a paper bag in front of the car heater. Hot air directed onto the can in the bag with several other items was apparently enough. The can exploded and hurled the metal top into the leg of the driver.

How many times have you seen aerosol cans in the trunk or passenger compartment of a car? Now might be a good time to check your car for potentially dangerous materials.

Do you have a partially used container of starter fluid? Many people who live in cold, wet climates use this substance to help make the car easier to start during damp weather. The fluid in these cans is highly explosive ether.

What about an aerosol can of carburetor cleaner, spray paint, or primer? Almost any of these pressurized containers will explode when it gets too hot. Some will allow dangerous vapors to escape even before they explode.

Perhaps you enjoy picnicking outdoors and have a can of insecticide in your car. The petroleum distillate base in these bug killers is kerosene. This flammable "coal oil" has been used for years to start fires and to fuel lamps. Some older cooking stoves even used this volatile fluid for fuel. And most service people know that kerosene is a close relative of jet engine fuel.

Earlier we mentioned that the critical factor in some accidents involving aerosol cans is temperature. How hot do you think it can get in the trunk of a car parked in the sun on a hot summer day? Our guess is something above 120 degrees, but the actual reading depends on a number of factors including color of the vehicle as well as the free air temperature.

That conservative estimate is almost 35 degrees above the recommended safe temperature for many pressurized aerosol cans.

Now let's go one step further. What do you think might happen if one or more of these pressurized bombs containing flammable liquid were stored in such a car along with a partially filled can of gasoline? Maybe nothing if there was no spark to set it off. But what if the person who opened the trunk was smoking a cigarette?

The explosion and resulting inferno would not be too nice.

Now we will ask the question again: **Is there a bomb in your car?**

BACKFIRE

INFANT RESTRAINT DEVICES

Reference Cpl Vernon's letter in the Feb '76 DRIVER, I would like to share a similar experience with one added endorsement, Infant Restraint Devices.

While stationed on the coast of Oregon I wrecked my '74 Vega. The car departed the road and landed inverted eight or 10 feet down the embankment on a large rock. My first concern was for my wife in the seat beside me. She was unhurt enough to state, "I can't find my purse!"

My thoughts next turned to my eight-month-old daughter in the back seat. The dome light in the mangled car still worked and by its light I saw my daughter hanging in her car seat with a look that seemed to say, "Gee, Daddy, that was fun. Let's do it again."

No one was hurt in the accident, and I have the Air Force safety program to thank for averting a possible tragedy. Without the awareness engendered by the fine program and specifically by your magazine, my daughter might still have been riding in an old, hand-me-down car seat and the tone of this letter would be much different.

Just as in seat belts, you may need that expensive car seat only once, but which once?

SSgt Richard C. Givens, USAF
HQ 3rd Brigade 1st Armd Div
APO New York 09139

Thank you so much for sharing your experience with us. We print it for the benefit of other parents, as well as for the pleasure of every person who works in the Air Force Safety Program.

"HITCHHIKER" SAFETY VIOLATION?

In the Jan '76 issue, the article entitled "Hitchhiker" there appears to be a safety violation. On page 9 there is a man, whom I assume to be a hitchhiker holding what appears to be a Colt .357 magnum revolver at the back of the driver's neck. One of the first safety precautions is that a gun, loaded or not, is never pointed at a person unless use is intended. Was the gun pictured a model or the real thing?

In either case it is a direct violation of the small arms safety procedures.

TMC(SS) David E. Fulton, USN
Range Safety Officer
USS JAMES MONROE (SSBN622)
FPO New York 09501

We quite agree with your comments that the photo represents a safety violation, at least to you sharp-eyed readers who know the small arms safety rules. Although this photo was posed, obviously no criminal is going to follow the rules of good gun handling. He means business, and he wants his victim to know it.

The photo was provided by the Naval Safety Center at Norfolk, VA, which staged it by using an unloaded revolver. For added realism, our art department painted bullets into the chambers.

CITIZEN BAND RADIOS

Your article "Citizen Band Radios" (Mar '76) was very good, but not complete and somewhat misleading. The first misleading statement which I read was that it would take about two weeks to get an FCC license. The present average is ten to 12 weeks. However, the FCC has just recently started a temporary license program to allow immediate use of a new CB radio. This temporary license consists of the letter "K," the initials of the first and last name of the applicant, and the ZIP code. This temporary call sign must be indicated on the application for a permanent license.

The "Revised APCO Ten Code" which you printed is somewhat different from the "Ten Codes" which I am used to using. For instance, 10-10 in this area means "Call completed, standing by." Also, 10-36 is used for "Time" vice 10-34. Another commonly-used Ten Code is 10-77, "Negative contact" meaning no contact with the station I was trying to call.

The most used Channels which you printed neglected to mention Channel 19 which is now used, although not officially designated, as the Truckers' Channel. It is used for traffic information and is also used for local area information. This is also the Channel which most mobile CBers monitor to get "Smokey" reports.

Another facet of CB which was neglected in your article was Single Sideband (SSB) operation. Use of a SSB radio effectively triples the available channels; however, they cost more and not too many CBers have them.

Lt Stuart S. Cope, Jr., USN
NAS Oceana
Virginia Beach, VA 23460

You're definitely right about the increased licensing period. We printed an update on the situation in the April

issue, but we didn't know about the temporary license.

As far as the Ten Codes go, the list we used came from Mission Electronics, a chain electronics firm here on the West Coast. It seems that all the letters we've had complaining that they were wrong have come from the East Coast which leads us to believe there still isn't much standardization in the Ten Codes from coast to coast. Here in California, the Ten Codes are used as listed.

The same holds true for use of Ch. 19. In Texas Ch. 19 is the contact channel. Evidently many of the codes and contacts are subjective, depending on what area of the country you're in.

TEACHING TECHNIQUES

In "Teaching Yourself Advanced Techniques" (MAR '76 DRIVER), you advocate the 9 and 3 o'clock position for hands on the steering wheel. Several philosophies are available on the subject, but I have found a 10 and 2 o'clock position more advantageous. This is particularly true for smooth control. Over-correction in skid control occurs when using 9 and 3. It also involves a fatigue factor. If the 10 and 2 is employed, the weight of the arms can be placed on the wheel. Especially on long drives this becomes important.

In your discussion of, "If You Go Off the Pavement," your method of returning if there is a tree ahead is good. That same procedure should be used in all cases. If the tree is too close and time is not available to slow and regain control, you had better leave the road and drive the other side of the tree. You will probably broadside the tree if you try to jerk the car back up on the pavement.

CW02 E. K. McGuire, USN
SUBSHIPS
Groton, CT 06340

Thanks for your comments. It is always gratifying to hear from a reader who really thinks about the fine points of driving.

CAR VS MOTORCYCLE SAFETY

I think the point that some of your readers are trying to make in their letters lately is that one is more apt to get hurt riding a motorcycle vice a car. Despite all the safety features many of these motorcycle companies present, the rider is virtually without any protection with the exception of his head (provided he is wearing a helmet). One must realize that his entire body is exposed, and the human body isn't capable to withstand the impact of a two-ton piece of machinery hitting one with the force of 30 mph. That is giving the cyclist the benefit of the doubt – a car moves much faster than 30 mph.

If you should see a motorcycle and a VW in a head-on collision, whom do you think would wind up hurting more? A car will take most of the impact in a collision; a bike, well, the driver would have to be a human shock absorber. Granted, one is very likely to get hurt in a car, but his chances of staying alive and being able to talk about it are much greater. Motorcycling is alright in the world of competition and recreation, but I feel it is definitely not a safe means of transportation.

If I were going 50 mph and dead-ahead of me was a tractor trailer going 50 mph, and we were going to hit head-on, I would rather have four tires, a chunk of metal and a roof over my head than a wheel, a handle bar and a sky over my head. I may not make it alive, but at least there would be something left of me.

YN1 William C. Simmons, USNR (TAR)
USS MYLES C. FOX DD-829
FPO New York 09501

TRAVEL PAY . . . TILT!!

I was happily reading your June '76 issue and thoroughly enjoying myself when I found something on page 1 that causeth me to rend my garment in anguish. Your statement: "DOD travel regs for PCS moves allow you one travel day for each 300 miles. If the distance is 301 miles, you'll get an extra day to make the trip."

Allow me to quote paragraph 6-24, Army Regulation 37-106:

"For travel performed by privately owned conveyance 300 miles per day will be the rate used for computation of travel time . . . A fraction of 300 miles which is in excess of 150 miles will be credited as one day for travel time purposes. A fraction of 300 miles which is 150 miles or less will be dropped."

I know not what course the other services take, but for the Army, 301 miles will get you only one day of travel. I feel sorry for the Finance Offices (Army) who are being besieged by members clutching copies of the June '76 DRIVER screaming at the service counters demanding their additional day of travel time.

SSgt(P) Robert J. Graham
Finance Services Dept.
U.S. Army Institute of Administration
Fort Benjamin Harrison, IN 46216

We're sorry, too, because some Navy, Air Force, and Marine Corps finance folks may also be unhappy. Although we read word-for-word our statement in the June issue to a military pay clerk who confirmed its accuracy, he obviously goofed like we did. AF Manual 35-6 and the Navy BuPers Manual both coincide with AR 37-106. DOD military personnel in POVs are allowed one day's travel time for trips from 150 to 449 miles, two days for 450 to 749, three days for 750 to 1,049, etc. Although our Coast Guard readers come under Dept. of Transportation regs, they follow the same JTR in computing travel time in POVs.

Address your letters to:
Editor
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☆U.S. GOVERNMENT PRINTING OFFICE: 1976—683-613/12

MISS DRIVER

CLAUDIA M. MAHIN, USN

"Because we do more driving these summer-time weekends and holidays, a lot of us will be pulling up to the self-service pumps in order to save a little money on gasoline. There's nothing wrong with that, but don't forget to do all those other little things—check the tire pressure frequently, the condition and level of the oil. Look at the battery (especially important in hot weather) and keep the terminals clean. Occasionally take a look at the radiator pressure cap and check the transmission fluid, too."